

REMARKS

Claim 1 has been amended to incorporate therein the recitation of claims 6 to 9. Claims 6 to 9 have been canceled. Also, claim 1 has been amended to recite that the thin portion having a thickness of 0 accounts for 10% or less of an entire area of the well layer. Support is found, for example, at page 13, lines 23-32 of the specification.

Withdrawn method claim 24 has been amended to include all of the limitations of device claim 1. If claim 1 is allowed, Applicants respectfully request rejoinder of the withdrawn method claims pursuant to MPEP § 821.04.

Further, the amendments to claims 2-23 and 25-38 relate to form and no change in the scope of these claims is intended.

Claims Distinguish Over Cited Prior Art

Claims 1-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada (U.S. Patent Application Publication No. 2003/0151044) in view of Nagahama (U.S. Patent No. 6,172,382).

Yamada was cited as teaching a light-emitting device substantially as claimed, including a multiple quantum well structure having a well layer comprising a thick portion and a thin portion. The Examiner relied on Nagahama as disclosing that the barrier layer may contain a dopant. The reason for rejection was that it would have been obvious to "dope the barrier layers in Yamada's device as taught by Nagahama."

Applicants traverse, and respectfully the Examiner to reconsider in view of the amendment to the claims and the following remarks.

Claim 1 recites among other elements: "the thick portion has a thickness of 1.5 nm to 5 nm, the thin portion has a thickness of less than 1.5 nm, the thick portion has an arithmetic mean width, as measured in a cross-section of the multilayer structure, of 1 nm or more, the thin portion has an arithmetic mean width, as measured in a cross-section of the multilayer structure, of 100 nm or less, and the thin portion having a thickness of 0 nm accounts for 10% or less of an entire area of the well layer."

An object of the present invention is to provide a gallium nitride compound semiconductor multilayer structure useful for producing a gallium nitride compound semiconductor light-emitting device which operates at low voltage while maintaining satisfactory light emission output (see page 4, lines 19 to 24 of the present specification).

The present invention is characterized in that the well layer comprises a thick portion and a thin portion which have a specific configuration. The above object of the present invention has been attained by forming the thick portion and the thin portion, which have a specific configuration, in the well layer.

When the well layer does not have the specific configuration as defined in claim 1, a gallium nitride compound semiconductor light-emitting device, which operates at a low voltage while maintaining satisfactory light emission output, is not obtained (see page 13, lines 1 to 32 of the present specification).

Turning to the cited prior art, Yamada relates to a light-emitting device including at least two well layers emitting different color light so that white light can be obtained by mixing the different color light (see paragraph [0011] of Yamada). An object of Yamada is to improve luminous efficiency of the white light by enlarging the roughness of the second well layer more than that of the first well layer (see paragraph [0012] of Yamada). Therefore, the object of

Yamada is different from that of the present invention, and the effect obtained by roughening the well layer also differs from that of the present invention.

Further, Yamada discloses that the second well layer has dished portions (presumably corresponding to the thin portions in the present invention) having a thickness of less than half of an average thickness thereof and an area of the dished portions preferably accounts for 10 to 50% of the whole area thereof (see paragraph [0037] to [0041] of Yamada). However, there is no description and no suggestion of a thickness and width of each thin portion (dished portion) and each thick portion as claimed in amended claim 1. Moreover, there is no description or suggestion of the thin portion having a thickness of 0 that accounts for 10% or less of the entire area of the well layer.

Nagahama does not disclose a well layer comprising a thick portion and a thin portion, and therefore does not remedy the deficiencies of Yamada. Thus, the combination of Yamada and Nagahama could never achieve the invention as defined in amended claim 1 and does not establish a *prima facie* case of obviousness.¹

That is, Applicants have demonstrated that Yamada does not meet all of the elements of claim 1, and Nagahama does not compensate for the deficiencies of Yamada. Together, these references would not have (and could not have) led the artisan of ordinary skill to have achieved the invention of claim 1.

¹ To establish *prima facie* obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP § 2143.03.

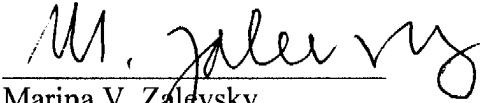
For the above reasons, it is respectfully submitted that the present claims are patentable over Yamada in view of Nagahama, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections, rejoinder of claims 24-38 and allowance of claims 1-5 and 10-38 is earnestly requested.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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